

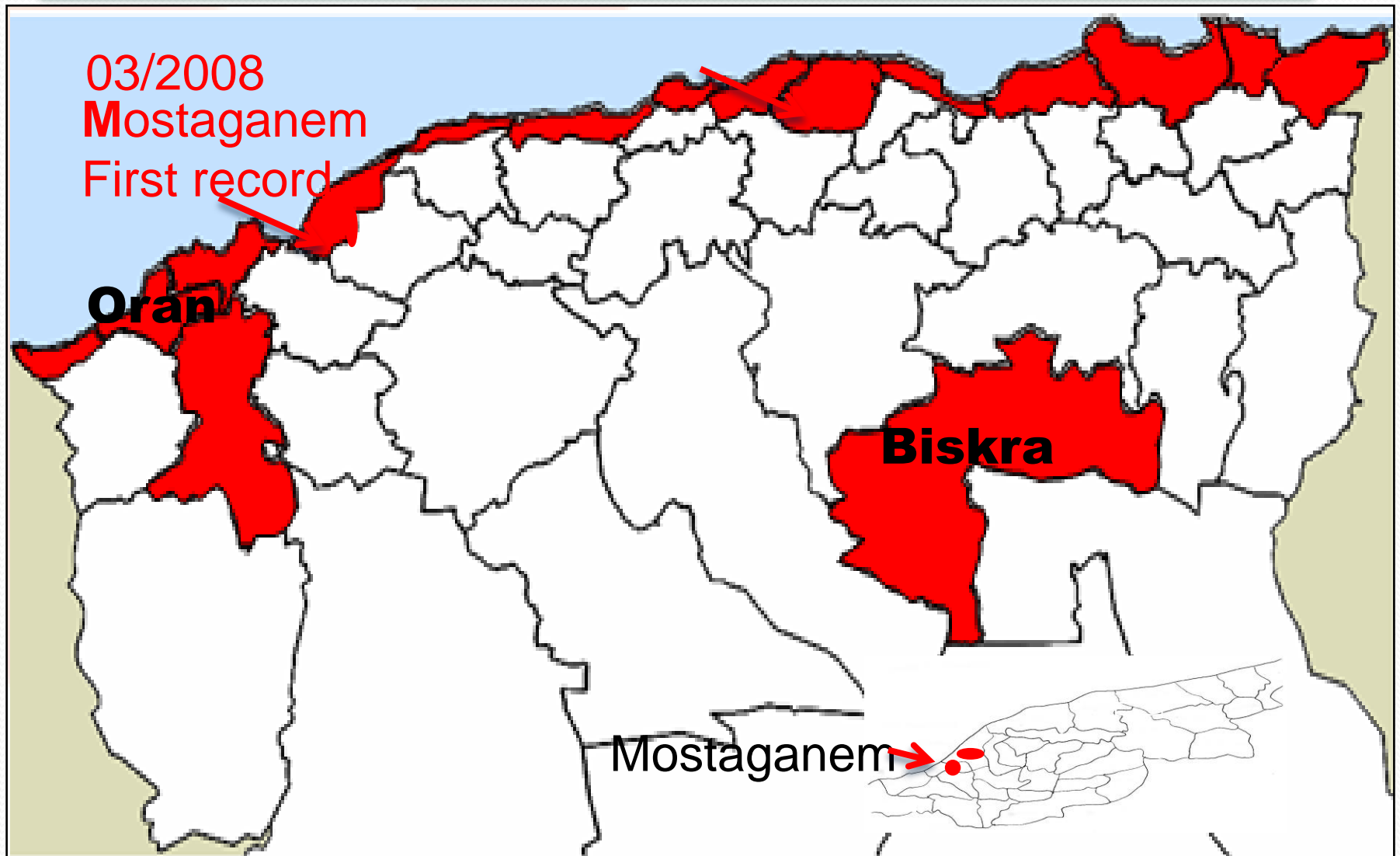
**International symposium on management
of *Tuta absoluta* -Agadir-Marroco,16-11-
2011**

**Importance of native polyphagous
predators able to prey on *Tuta absoluta*
Meyrick (Lepidoptera: Gelechiidae) on
tomato crop**

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Algeria (DZ)*

Distribution of *T. absoluta* in Algeria



Current status of *T. absoluta* in Algeria: Why is it becoming the major pest on tomato crop ?

- **Favorable weather conditions → + 10 generations per year**
- **Presence of various host-plants (crops and weeds) and great susceptibility of tomato varieties to *T. absoluta***
- **Sometimes prophylactic measures are inefficient**
- **The dramatic effects of overtreatment with broad-spectrum insecticides resulting in insecticide resistance and others consequences**

Consequences

- Severe crop losses (greater damage is caused on fruit during later parts of growing season)
- *Tuta absoluta* is a severe pest having economic injury levels below the equilibrium position
- Constant interventions are required to produce marketable fruits



The objective of this study

- 1/ First step: to obtain information on which predators are actually consuming the target prey in the field by direct information in the vicinity of Mostaganem
- 2/ Second step: simply to combine hungry predators with the target prey in the laboratory and see whether predation occurs
- 3/ Third step: to measure predation with each strain of mirid considering that the result will be the same as those of the field population under study
- 4/ To assess plant damage and others types of injury
- 5/ To study interactions between different species and strains

What do we expect from native mirids?

- **We have 3 generalist species which feed on aphids, whiteflies and *on T.absoluta in field***
- **These native predators, when conserved, can help suppress native and exotic pests**
- **These predators are a resource present on the farms that can be used for a long time**
- **Natural control of pest by existing of these natural enemies can be demonstrated to growers by direct teaching**

Bugs Preying on T absoluta



Heteroptera: Miridae

Nesidiocoris tenuis (Reuter)

Macrolophus caliginosus
(Wagner)

Dicyphus tamaninii (Wagner)



Effectivity of predators

Materials and Methods

Materials

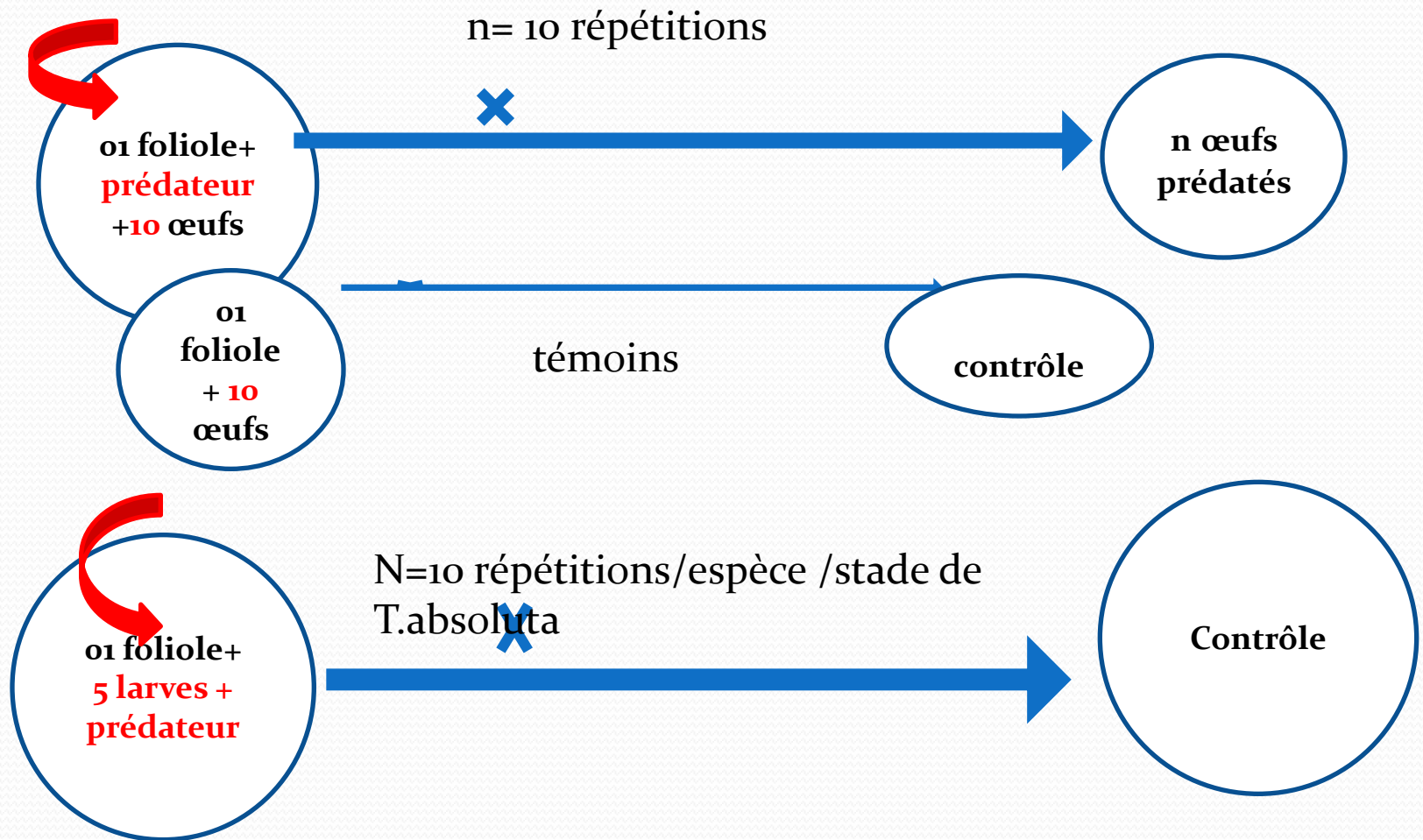
Host plant: tomato var Tafna

The preys: *T.absoluta* (eggs, L1, L2, L3, L4)

**The predators: *N.tenuis*, *M. caliginosus*
*D.tamaninii***

- **Leaflets are used for larvae**
small disks cut in the fresh tomato leaf
for eggs

Protocole expérimental



Prédation des œufs



Predation of *T. absoluta* by *N. tenuis*

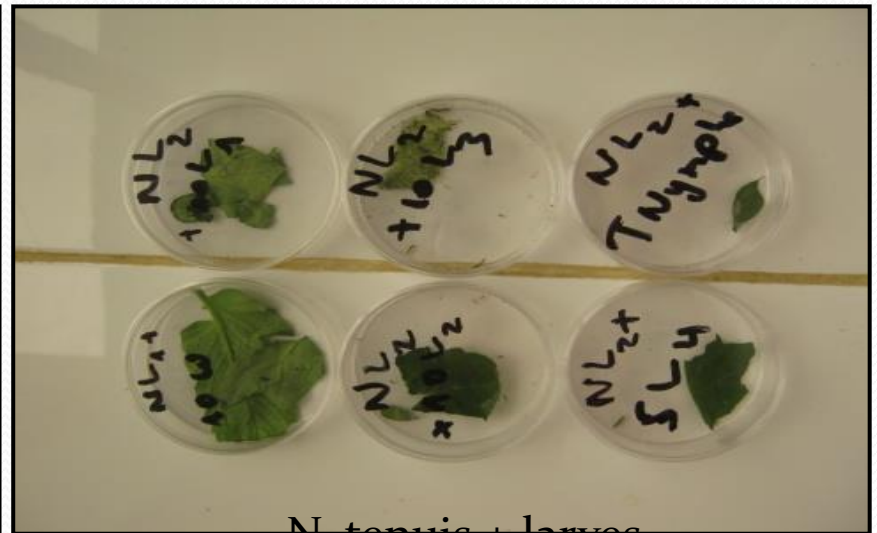
Material and methods

T. absoluta



N. tenuis + les œufs

N. tenuis



N. tenuis + larves

Dispositif pour la prédation des larves

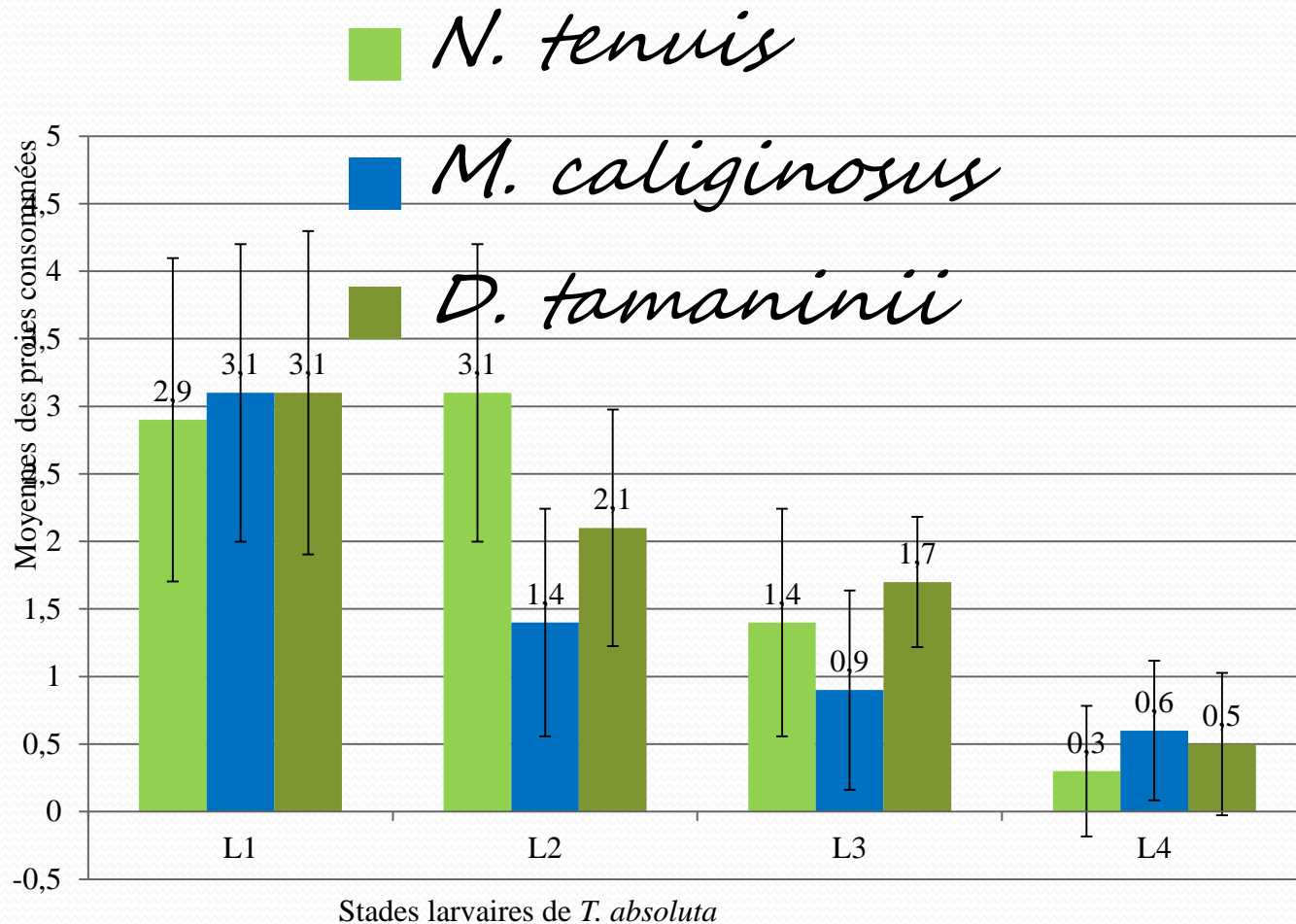


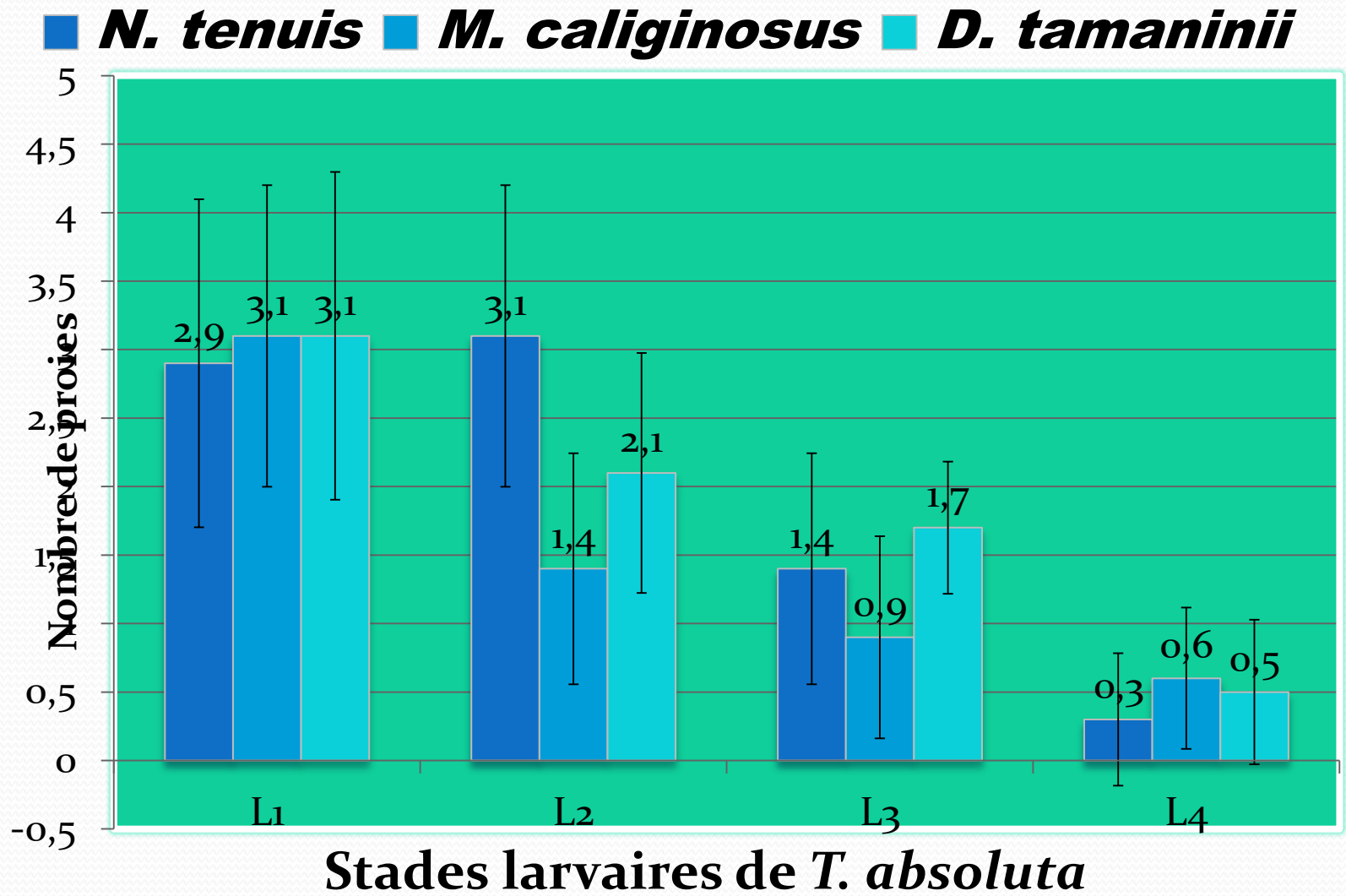
Predation of eggs by both predatory mirids

Prédation des œufs de *T.absoluta* par les 3 espèces

Prédateurs	<i>D. tamaninii</i>	<i>N. tenuis</i>	<i>M. caliginosus</i>
Moy \pm Ecart-type	9,9 \pm 0,316 _a	7,8 \pm 2,53 _b	9,2 \pm 1,32 _{ab}

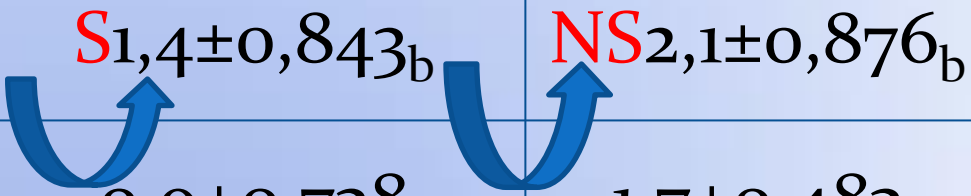
Predation of mirids on larvae





Résultats

Stade larvaire de <i>T. absoluta</i>	Nbr de larves prédatées/ espèce		
	<i>N. tenuis</i>	<i>M. caliginosus</i>	<i>D. tamaninii</i>
L1 (NS)	2,9±1,197	3,1±1,101	3,1±1,197
L2	3,1±1,101 _a	S1,4±0,843 _b	NS2,1±0,876 _b
L3 (NS)	1,4±0,843	0,9±0,738	1,7±0,483
L4 (NS)	0,3±0,483	0,6±0,516	0,5±0,527

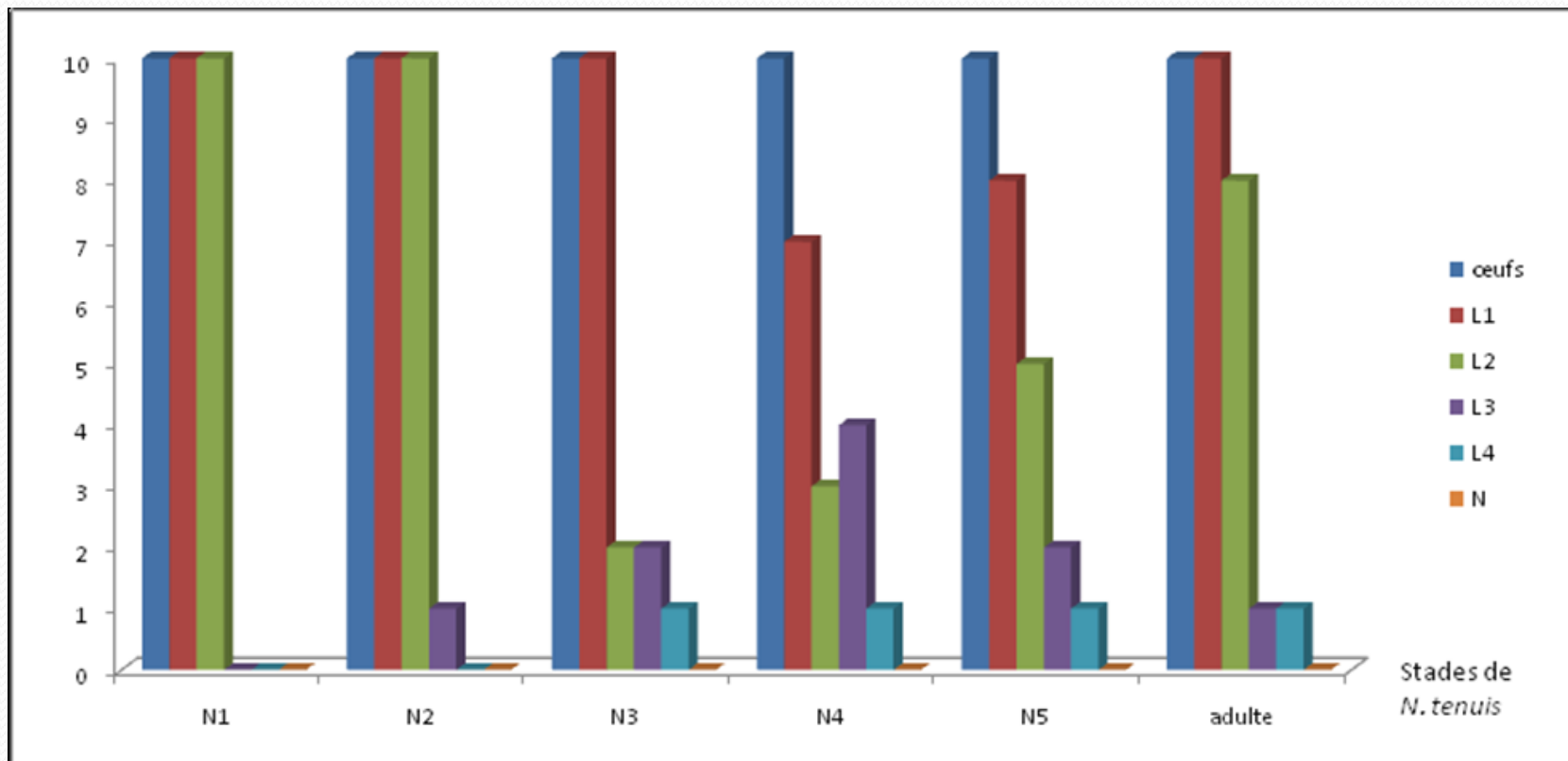


Rearing of bugs (*N.tenuis*) in cages

Élevage des prédateurs en cage



Prédation des 5 stades de *T. absoluta* par tous les stades de *N. tenuis*: Résultats



Advantages:

Disponibility dans le milieu

Adaptation aux variations climatiques

Capacité de recherche des proies

Acceptation de diverses proies

Inconvenience

Competition (inter et intra specific)

Phytophagous???



**Evolution des populations de
T.absoluta en serre pendant la
culture de printemps**

2 types of greenhouse



Commercial greenhouse



Suivi de la culture de tomate

- **Mise en place: début février**
- **Conduite de la culture de fin 02 à début 07/2010**
- **Protection par un filet à mailles fines**
- **Piège à phéromones type Delta**

Niveau de prédation et différence entre espèces : Test newman-keuls

- **Stade œuf: forte; DNS entre espèces**
- **Stade L1: forte; DNS entre espèces**
 - Stade L2: DS ($P < 0,05$) plus consommé par *Nesidiocoris tenuis***
 - Stade L3: faible ;D NS ($P > 0,05$)**
 - Stade L4: faible**
 - Stade Nymphal rare; DNS ($P = 0,08$)**

Matériels et méthodes

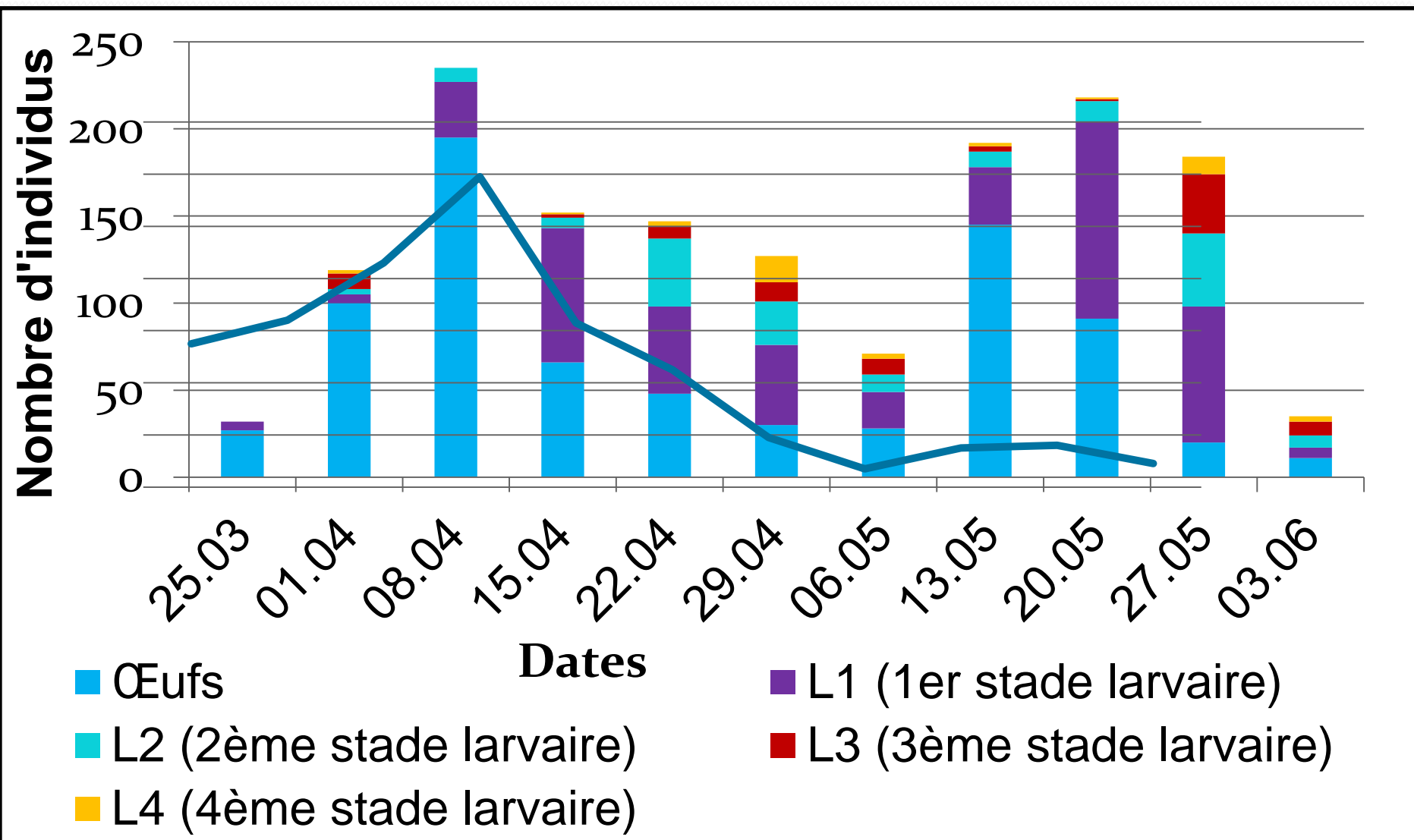
**Relevé des captures de mâles
dans piège 1j/7**

**Echantillonnage hebdomadaire:
prélèvement de 10 folioles /plant N=25 plants
Dénombrement des stades/sous binoculaire**

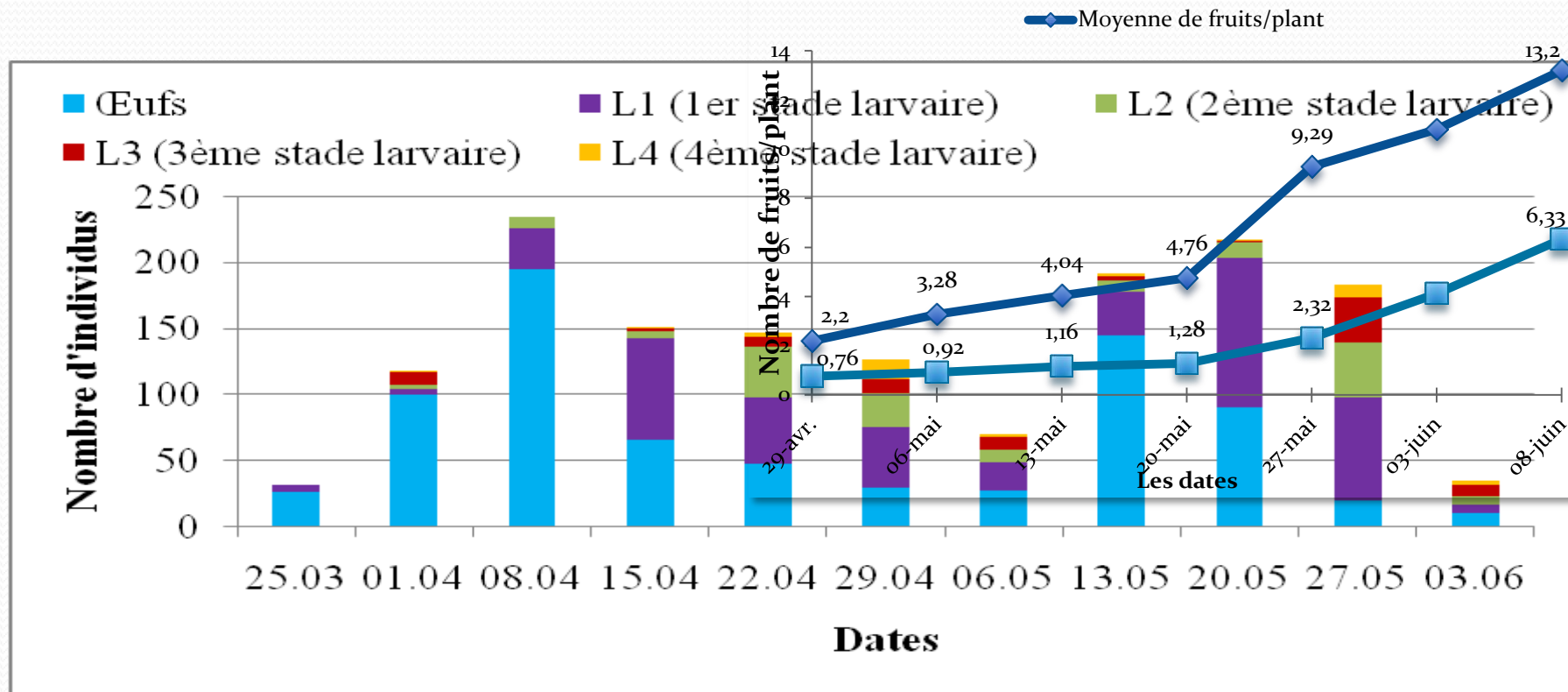
Dépouillement des stades de *T. absoluta*



Tuta absoluta: structure des populations en serre de tomate



Cinétique des populations de *Iua absoluta* dans une serre traditionnelle.



Aspects de la culture



protégée



non protégée

Situation dans les serres

- **La mineuse pénètre dans la serre malgré des mesures de protection**
- **N générations chevauchantes par saison (climat très favorable)**
- **Près de 50% de fruits touchés avec 30% invendables**

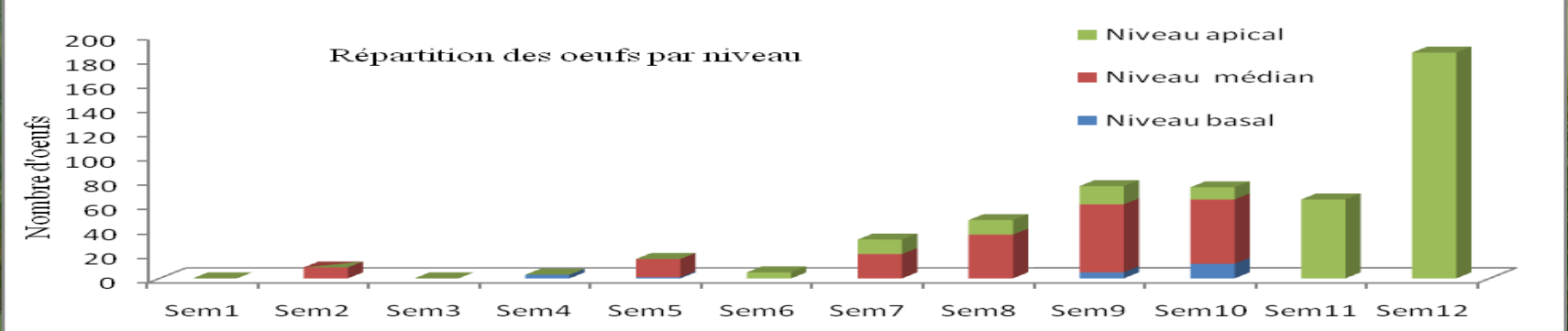
Commercial greenhouse



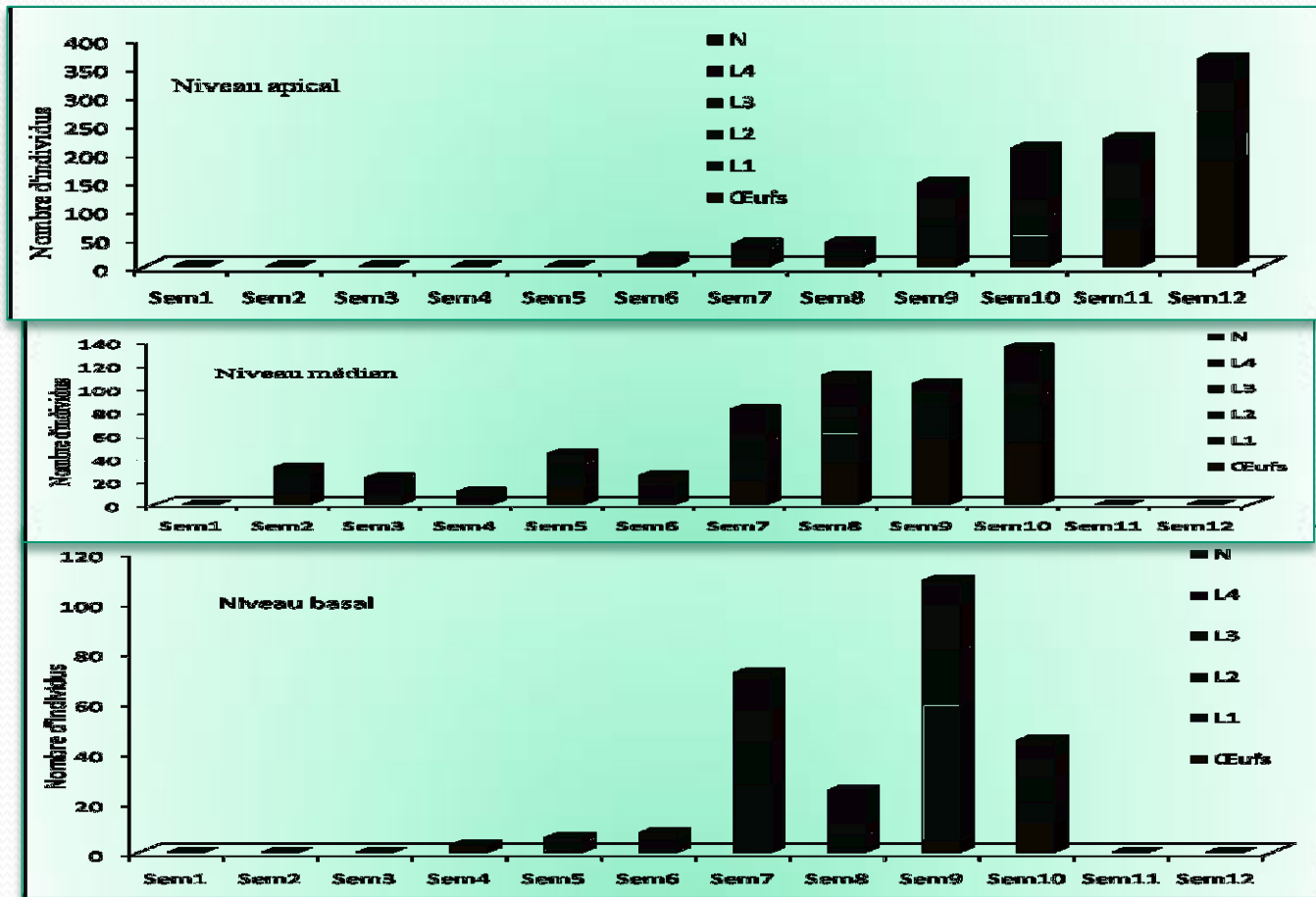
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Distribution of *T. absoluta* in a greenhouse



- **The relative efficiency of all species is shown**

The most vulnerable stages for management of *T.absoluta* are: eggs and young larvae

- **It is better to consider natural biological control through the conservation of these predatory mirids**

Lutte intégrée contre *T. absoluta*

- **Prophylaxie renforcée**
- **Piégeage des mâles pour seuil nuisibilité**
- **Réaliser traitement chimique si besoin ; choix du produit?**
- **Favoriser les entomophages autochtones**
- **Installer des prédateurs dès le début de l'infestation**

How to protect and to validate indigenous strains?

- **Reducing chemical control**
- **Having a wide knowledge of the ecosystems**
- **Introducing new species or strains of entomophagous is not without potential consequence to indigenous predators**
- **Each proposed introduction needs careful evaluation to ensure that it is well conceived and executed**

- **Avoiding to pose risks to native strains if imported species are aggressive**

**Human activities can greatly influence
natural enemies
(predators) to be able to suppress
*T.absoluta***

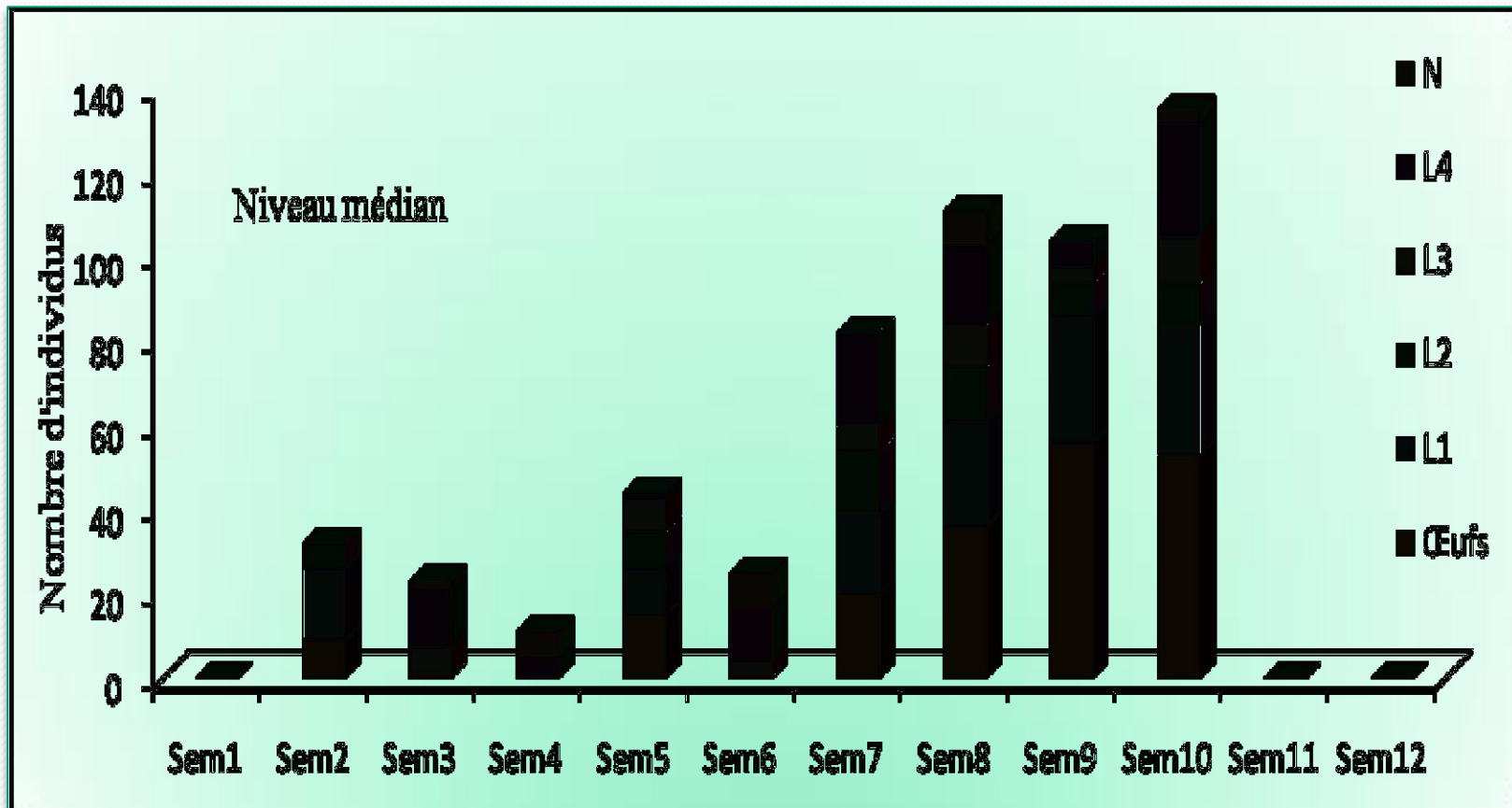
Principal biological control methods

Three major methods exist:

- **Conservation :**
- assumption that species of predators already exist locally, have the potential to effectively suppress the pest if given an opportunity to do so
- **Introduction:**
- Yes! This approach historically has been extremely successful. To be conducted safely introduction BC programs require a high degree of scientific skill.....
- **Augmentation:** This method covers inoculative releases or mass releases (in greenhouses) this method may be directed against native or exotic pests.

Structure des populations de *T. absoluta*

Niveau médian de la plante



Future prospects

- **There are opportunities for use of biological control in areas which have received little attention**
- **Introducing new species of entomophagous (predators or parasitoids) to control exotic pests is not without potential consequences to indigenous species**
- **Each proposed introduction needs careful evaluation to ensure that it is well conceived and executed.**



Creation and use of pesticide resistant natural enemy populations

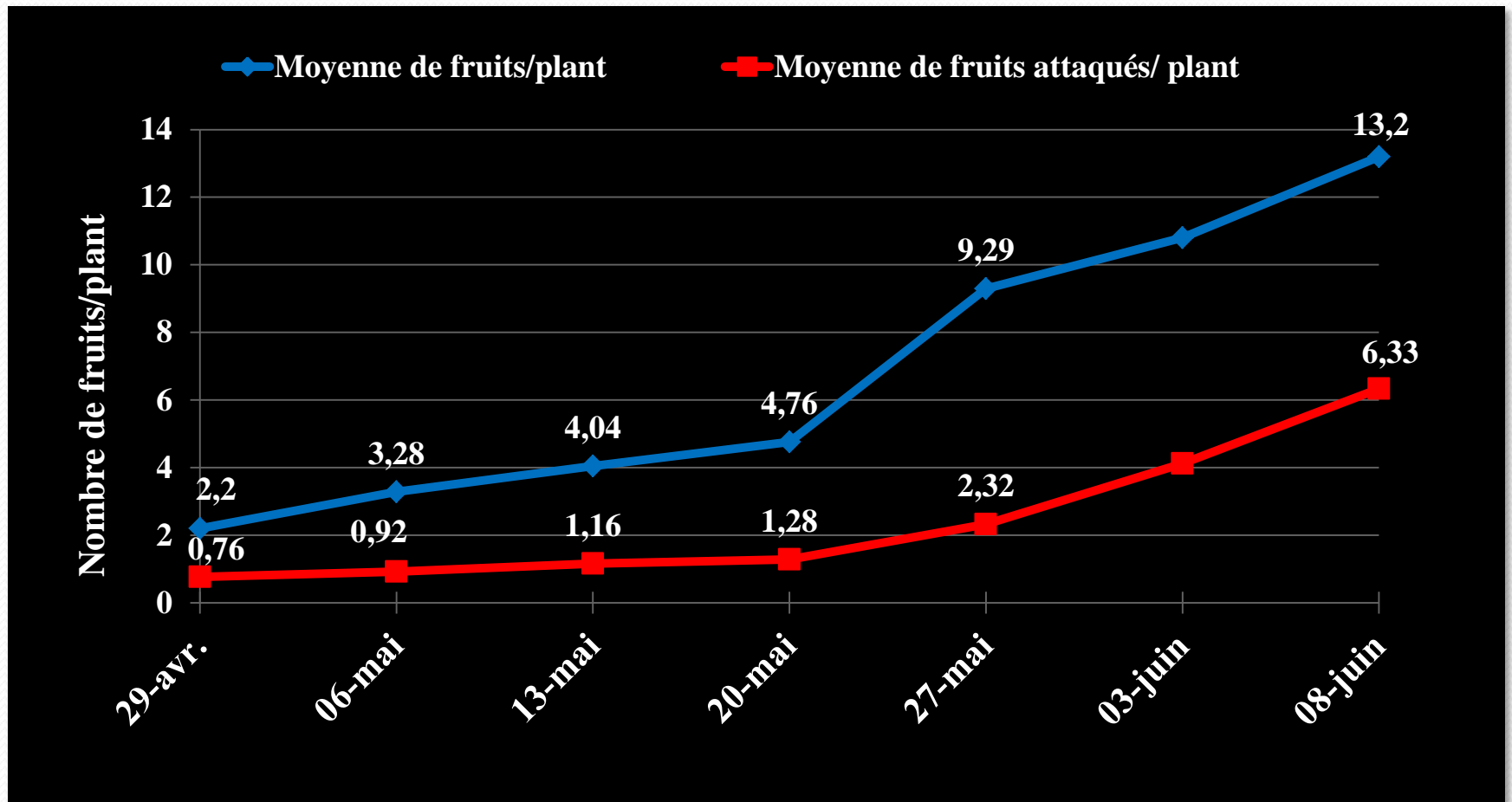
Pesticide-resistant strains of several species of predators have been developed by laboratory selection or recovered from field populations

Merci de votre attention



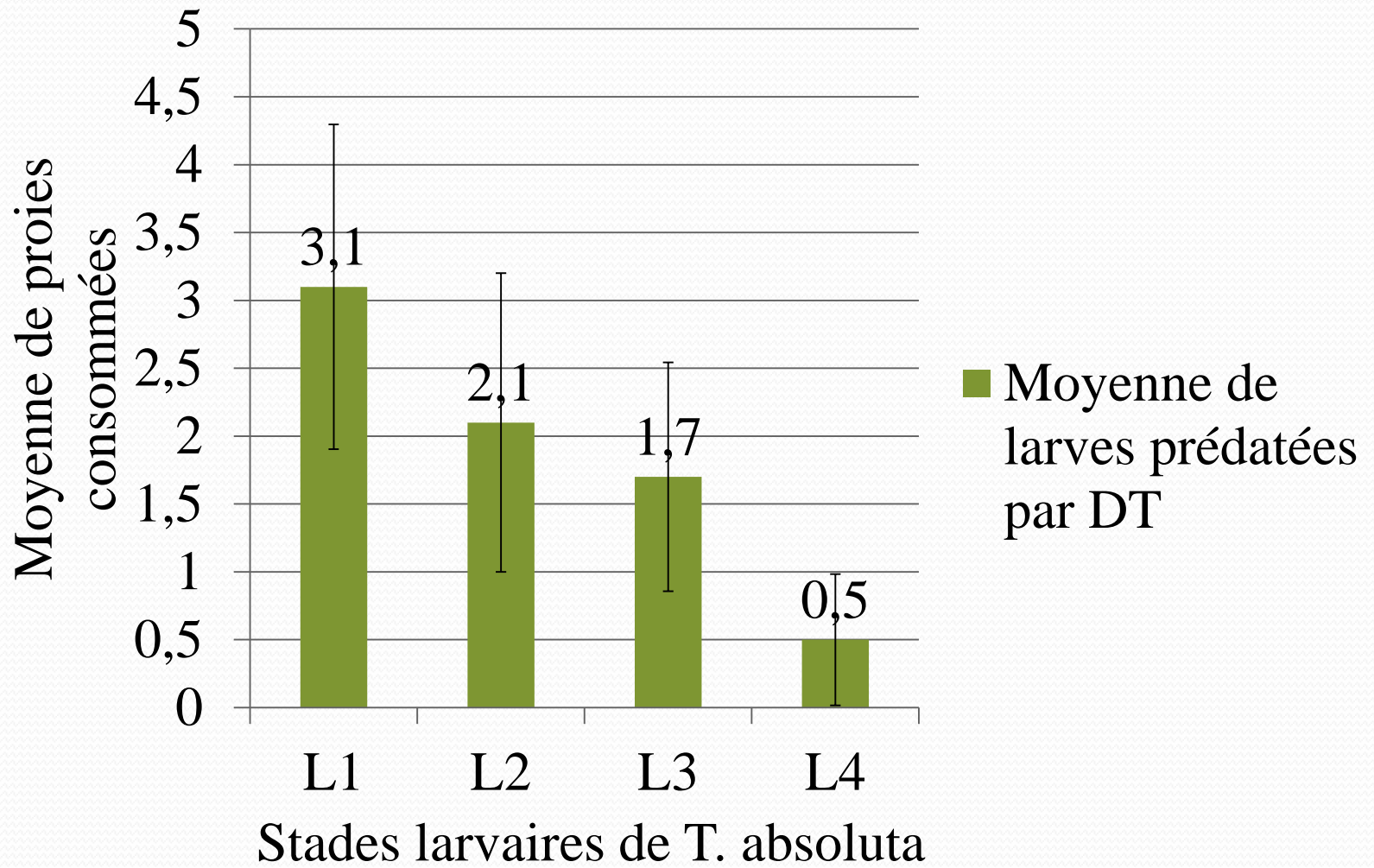


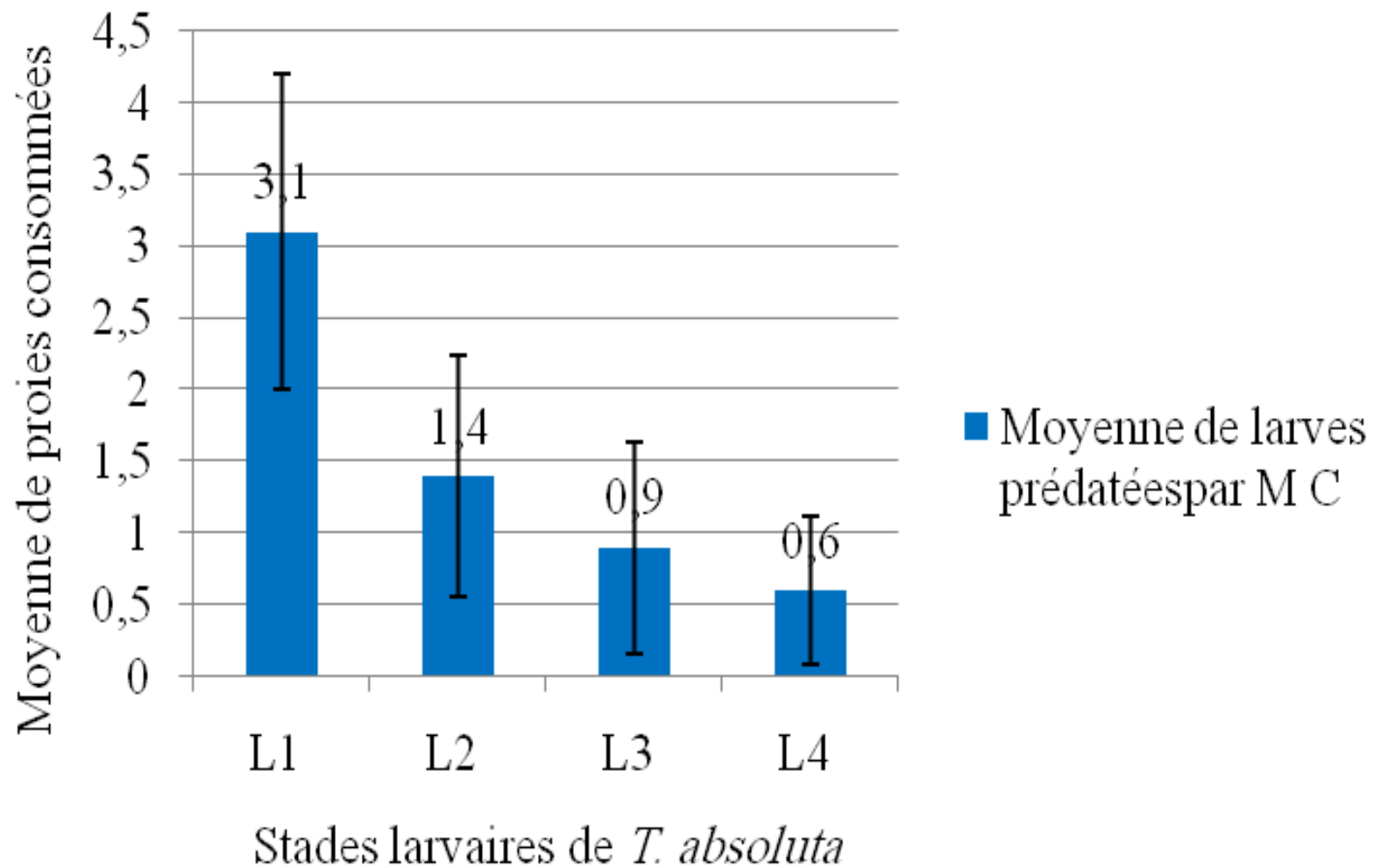
Fruits attaqués/fruits sains

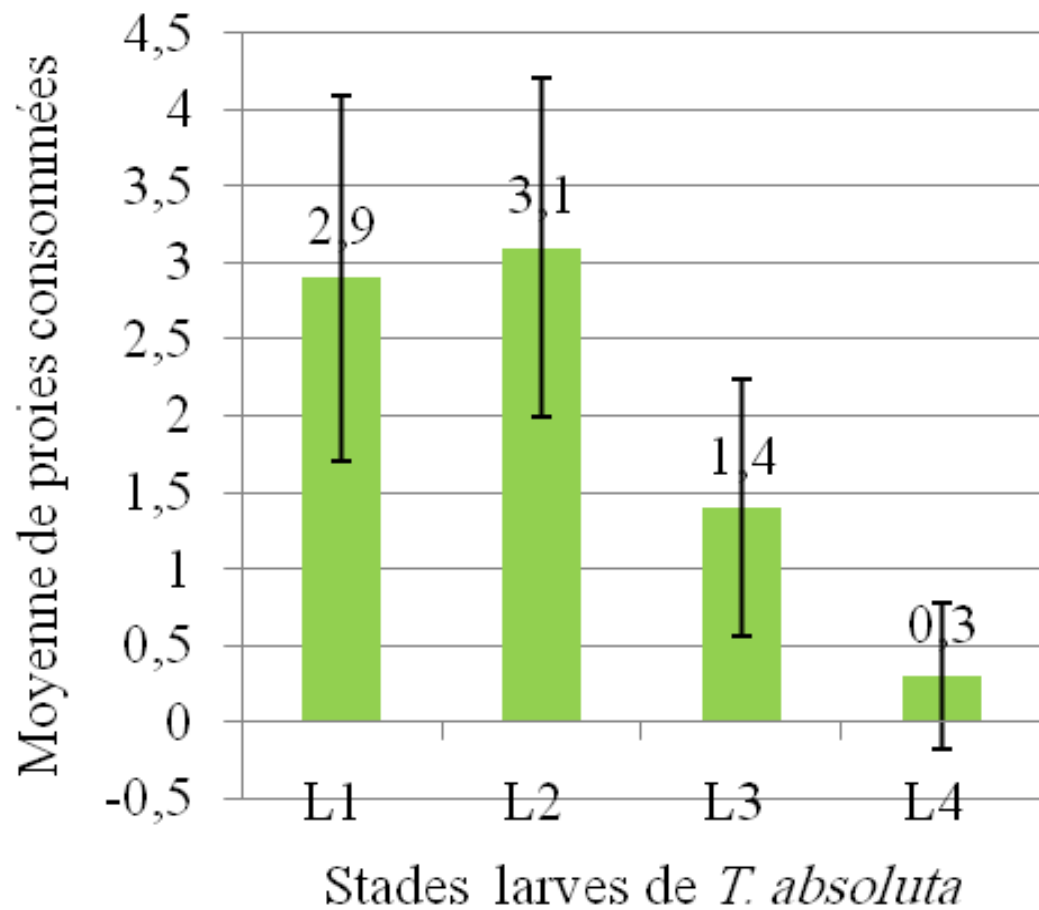


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■ Moyenne de larves prédatées par NT

Native predatory mirids found preying on *T. absoluta* in the vicinity of Mostaganem

